

HYDROZOA FROM THE COASTS OF NATAL AND PORTUGUESE EAST AFRICA

PART II: GYMNOBLASTEA

By

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(With 4 figures in the text)

INTRODUCTION

This paper represents the second part of an account of the Hydrozoa from the east coast of South Africa. The first part, dealing with the Calyptoblastea, was published in the same journal in 1958.

The material includes a relatively small number of species, only 12 in all, of which 2 are new species, and 3 are new records for the country. All of them come from the littoral area or shallow water to a depth of about 7 m. There were no identifiable gymnoblcasts present in the collection trawled by the s.s. *Pieter Faure* off the coast, although calyptoblcasts were plentiful. However, one must bear in mind the fact that the *Pieter Faure* material was collected nearly sixty years ago and the preservation was not good. Under such circumstances the gymnoblcasts are the first to suffer, and in fact a few decayed remnants indicate that several species were originally present.

The classification adopted is based on that of Rees 1957, who has attempted to integrate the traditional dual classification of hydroids and their medusae into one coherent system. Such a system should be the ultimate aim of all systematists, and a revision of the group along these lines has long been overdue. I am indebted to Dr. Rees for valuable advice on the position of problematical species.

Also following on the lines laid down by Rees I have retained 'separate genera for hydroids with fixed gonophores and for hydroids with free medusae'. In some cases this distinction is clear-cut and straightforward, but in the case of *Hydractinia* and *Podocoryne* it is not so easy, for there are various intermediate forms which produce degenerate medusae with a very short free-swimming life. Although previously following Kramp, who combines the two genera, I have now kept them apart, and have used *Podocoryne* to include forms which produce medusae of a recognizable Podocoryne type, i.e. with 4 oral tentacles, and

Hydractinia for forms with fixed gonophores of the styloid to eumedusoid type without oral tentacles, even though they may be freed for a short while.

The structure of the nematocysts of hydroids has been receiving increasing attention since the classic work of Weill in 1934. It is difficult as yet to estimate the value of nematocysts in systematics, for so few species have been fully described, but there is evidence that in some families at least they provide a useful method of distinguishing otherwise closely related species. The difficulty is that a systematist almost invariably has to work on preserved material brought in by expeditions, where the chance of finding discharged capsules is remote and where the shape is liable to be distorted. It is felt that any information at this stage, however scanty, is of value, and will serve as a basis for a future full assessment of the value of these structures in classification. Accordingly descriptions and measurements of nematocysts have been included wherever possible, using the categories suggested by Weill. Measurements are given to the nearest half-micron.

The source of the material was detailed in Part I of the paper, and I wish to thank once again those who contributed to the collection. I am also extremely grateful to the Naturhistoriske Riksmuseet, Stockholm, and to the Zoological Survey of India, for the loan of type material. The cost of publication was partly defrayed by a grant from the Editorial Board of the University of Cape Town.

As before, the type material of new species has been deposited in the South African Museum (S.A.M.).

STATION LIST

D. Intertidal material from Isipingo and other localities near Durban, collected in July 1935 and July 1936.

DBN. Material from Durban Bay (a land-locked bay).

- | | | |
|----------|----------|--|
| DBN 2. | 7/7/50. | From floating jetty, Salisbury Island. |
| DBN 25. | 13/7/50. | From dead branch below low tide mark, Salisbury Island. |
| DBN 47. | 18/7/50. | Intertidal, on mud flats. |
| DBN 94. | 8/1/51. | Seined from shallow water north of Salisbury Island. |
| DBN 112. | 10/1/51. | Intertidal, on central sand bank. |
| DBN 130. | 15/1/51. | From ships' hulls operating only in Durban Bay. |
| DBN 140. | 16/1/51. | From rotting branch trawled in 0-7 m. north of Salisbury Island. |
| DBN 191. | 2/10/51. | Intertidal, on causeway. |
| DBN 249. | 24/4/52. | From ship's hull. |
| DBN 270. | 26/4/52. | Intertidal, on public ferry pier. |
| DBN 320. | 28/4/52. | From sublittoral fringe on caisson, Salisbury Island. |

IN. Material from Inhaca Island, Delagoa Bay, Portuguese East Africa. Collected by Mrs. M. Kalk.

- | | | |
|---------|----------|-------------------------------|
| IN 49 | 1954. | Intertidal. |
| IN 112. | 18/9/55. | Punta Torres. |
| IN 140. | 20/7/56. | East shore rocks, intertidal. |

MOR. Material from Morrumbene Estuary, inland from Inhambane, Portuguese East Africa.

- MOR 34. 20/1/54. From hull of wreck at Linga Linga.
 MOR 51. 21/1/54. Dredged from 3-5 m. off mouth of Rio Coche.
 MOR 216. 15/7/54. From hull of wreck at Linga Linga.
 MOR 217. 12/7/54. On weed in 2 m. of water at Linga Linga.
 MOR 218. 13/7/54. From hull of wreck at Linga Linga.

NA. Material from intertidal zone on Natal coast.

- NA 184. July 1950. Kosi Bay, reef, intertidal. Collected by B. R. Allanson.
 NA 218. 18/1/58. Wentworth Beach, Durban.

STL. Material from St. Lucia Estuary, Natal.

- STL 174. 12/7/49. 'Channel' area, south of Mpate River mouth, on aerial roots of mangroves.

LIST OF SPECIES

Corymorphidae

Corymorpha sp.

Tubulariidae

Tubularia warreni Ewer.

Cladocorynidae

Cladocoryne floccosa Rotch.

Pennariidae

Pennaria disticha Goldfuss

Clavidae

Corydendrium parasiticum (Linn.)

Eudendriidae

Eudendrium carneum Clarke.

Eudendrium ?parvum Warren

Hydractiniidae

Hydractinia diogenes n. sp.

Hydractinia kaffraria Millard

Podocoryne nassa n. sp.

Pandeidae

Hydrichthys boycei Warren

Bougainvilliidae

Bimeria fluminalis Annandale

Family **Corymorphidae**

Corymorpha sp.

Records. DBN 47P.

Description. A single sterile specimen growing in the mud and reaching a total length of 14 mm. Hydranths with at least 18 filiform tentacles in each group.

Remarks. In the absence of gonophores the species cannot be determined. This is probably a young individual.

Family **Tubulariidae**

Tubularia warreni Ewer 1953

Tubularia warreni Ewer 1953, p. 351, figs. 1-4.

Records. DBN 2.O, 130D (reported by Day and Morgans 1956).

Description. Rich colonies on floating jetty and ships' hulls, reaching a maximum

height of 5 cm., and with abundant gonophores. Structure agreeing with Ewer's description, with the following additions.

The longitudinal septa within the stem are a feature of the species, but are not constant in number and size. Some stems have 2 and some 3. In some cases they meet in the centre as in *T. mesembryanthemum*, but often they do not, and sometimes they are merely very low ridges on the internal surface.

The dilation of the stem on which the hydranth rests is surrounded at its widest part by a shallow transverse groove, above which the thickened ectoderm protrudes in a pendulous flap, as described for *T. bethae* Warren 1908. The ectoderm is also thickened on the lower surface of the dilation as described for *T. crocea* by Ritchie (1910b), but unlike the latter there is a definite thickening and differentiation of the endoderm lining the dilation, though not to the same extent as in *T. bethae*.

Hydranth tentacles often fewer than stated by Ewer, varying from 18 to 29 in the proximal row, and 15 to 24 in the oral row in mature specimens. Oral tentacles in one row, but occasionally alternate ones are slightly displaced.

Blastostyles not so constant in number as indicated by Ewer, and primary and secondary pedicels often difficult to distinguish. Actinula with as many as 6 oral tentacles at time of liberation.

Family **Cladocorynidae**

Cladocoryne floccosa Rotch. 1871

Cladocoryne floccosa. Allman 1872, p. 380, fig. 82. Warren 1908, p. 284. Vervoort 1941, p. 190. Records. NA 184D.

Description. A single colony creeping on weed. Stems simple or with one lateral branch; increasing in diameter from base to summit; annulated at base, smooth or roughly corrugated for remainder. Hydranths very poorly preserved. No gonophores.

Family **Pennariidae**

Pennaria disticha Goldfuss 1820, var. *australis* Bale 1884

Halocordyle cooperi Warren 1906, p. 73; Pl. g. 1907a, p. 209.

Pennaria australis var. *cooperi*. Warren 1908, p. 282.

Halocordyle disticha var. *australis*. Vervoort 1941, p. 192. 1946a, p. 290.

Records. D 39. NA 184B. DBN 2Q, 130B, 191D (recorded by Day and Morgans 1956). MOR 34J, 216A, 218A. IN 140D.

Description. Rich colonies from intertidal rocks, ships' hulls, etc., reaching a maximum height of 13.9 cm. Structure exactly as described by Warren. Hydrotheca-bearing ramules increasing in diameter towards distal end, and generally annulated in basal portion only, as characteristic of variety, but occasionally with annulations in distal portion as well. Gonophores observed in January, July and October.

Nematocysts of at least 3 kinds:

(i) Stenoteles.

(a) Large, reaching a maximum size of $47.0 \times 25.0 \mu$, present only on capitate tentacles.

(b) Small, varying in size from about $8 \times 5 \mu$ to $14 \times 10 \mu$, on filiform and capitate tentacles. Very abundant.

(ii) Desmonemes, $6.5 \times 5.5 \mu$, on capitate and filiform tentacles.

(iii) Undetermined heteronemes, $11.5 \times 5.0 \mu$, on filiform and capitate tentacles. Scarce. Capsule similar to the microbasic mastigophores described for *P. tiarella* by Weill 1934, fig. 21, each containing a large refringent sphere in the basal part.

Remarks. Four categories of nematocysts have been described by Weill 1934 for *P. tiarella*, and the maximum size for the stenoteles is given as $18 \times 11 \mu$. This species thus lacks the enormous stenoteles on the capitate tentacles which are characteristic of *P. disticha* (cf. also Warren 1906), and this may be contributory evidence for keeping the two species separate and not combining them as has been done by Vervoort 1941.

The undetermined heteronemes of the present material are almost certainly microbasic mastigophores, which occur in both *P. tiarella* and *P. cavolinii* (= *P. disticha*), and there is possibly a fourth category which can easily be overlooked in preserved material.

Family Clavidae

Corydendrium parasiticum (Linn.) 1767

Soleniopsis dendriformis Ritchie 1907, p. 495, figs. 142, 143; Pl. 26, fig. 1.

Corydendrium parasiticum. Vervoort 1946a, p. 292.

Records. DBN 2R, 140F.

Description. A well-developed colony reaching a maximum height of 7.2 cm. and a smaller one of poorly preserved material. Stem fascicled at base with a diameter of about 2 mm. Branching, and origin of hydranths as described by Ritchie, except that the branches are not strictly in one plane. Perisarc thick, smooth or faintly wrinkled, sometimes transversely folded below distal margin possibly due to contraction of the hydranth.

Hydranths with about 22–29 scattered, filiform tentacles (though this may be an underestimate since some of the tentacles may be retracted within the perisarc), and the typical swelling below the base inside the perisarc.

Gonophores absent.

Nematocysts of 2 kinds:

(i) Undetermined heteronemes, $7.0 \times 4.0 \mu$.

(ii) Desmonemes, $5.0 \times 3.5 \mu$.

Measurements (preserved material, mm.)

Hydranth pedicel, diameter	.	.	.	0.27-0.48
Hydranth, length	.	.	.	0.51-1.10
diameter	.	.	.	0.20-0.37

Remarks. The identification of this species is fairly definite in spite of the absence of gonophores, since the method of branching is exactly similar to that described by Ritchie 1907.

Vervoort 1946a has established fairly definitely that *C. dendriforme* (Ritchie) is a synonym for *C. parasiticum*, but I am not convinced of the wisdom of including *C. sessile* Ritchie 1910a as well, as has been done by Leloup 1937. Young hydranth pedicels in *C. parasiticum* are necessarily adnate due to the method of branching, but they do not remain so, and it is only the distal 2 or 3 pedicels in a stem which have this arrangement. Ritchie's material of *C. sessile* was a well-developed colony of 37 mm. in height, and the pedicels were apparently adnate throughout.

C. parasiticum is known from the Mediterranean, Cape Verde Islands, French Indo-China and the Dutch East Indies. This is the first record from South Africa. *C. sessile* has been reported from several localities in the Indian Ocean (Mergui Archipelago, Cargados and Amirante).

Family **Eudendriidae***Eudendrium carneum* Clarke 1882

Fig. 1, A-F

Eudendrium carneum Clarke 1882, p. 137; Pl. 7, figs. 10-17.

E. cunninghami Kirkpatrick 1910, p. 127; Pl. 7, figs. 1-3.

E. carneum. Vannucci 1954, p. 101; Pl. 1, figs. 1-9; Pl. 2, fig. 8; Pl. 4, figs. 2-5.

Records. DBN 25J, 130C, 249K, 270V, 320Q (reported by Day and Morgans 1956 as *Eudendrium ?racemosum*). MOR 34K, 216B, 217A, 218B.

Description. Rich, tree-like colonies, common on ships' hulls, wrecks and piers, etc., to a depth of about 6 ft. below water-level. Colonies reaching a maximum height of 16.2 cm. Branching irregular, main stem thick and fascicled, up to 3.5 cm. in diameter, larger branches also fascicled. Groups of annulations present on origins of branches, and rarely at intervals on main stem; hydranth-bearing ramules with scattered groups of annulations or completely annulated. Hydranth with pseudohydrotheca covering basal part and terminating in annular groove, with about 30 tentacles (26-33 in 20 counts). No cnidophores.

Female gonophores borne in a whorl on a tentacular blastostyle, becoming unevenly spaced along the length at a later stage when the blastostyle lengthens and the tentacles are lost. Gonophores with a bifurcating spadix, which is later shed. Developing embryo enclosed in a transparent perisarcial capsule which is basket-shaped when empty.

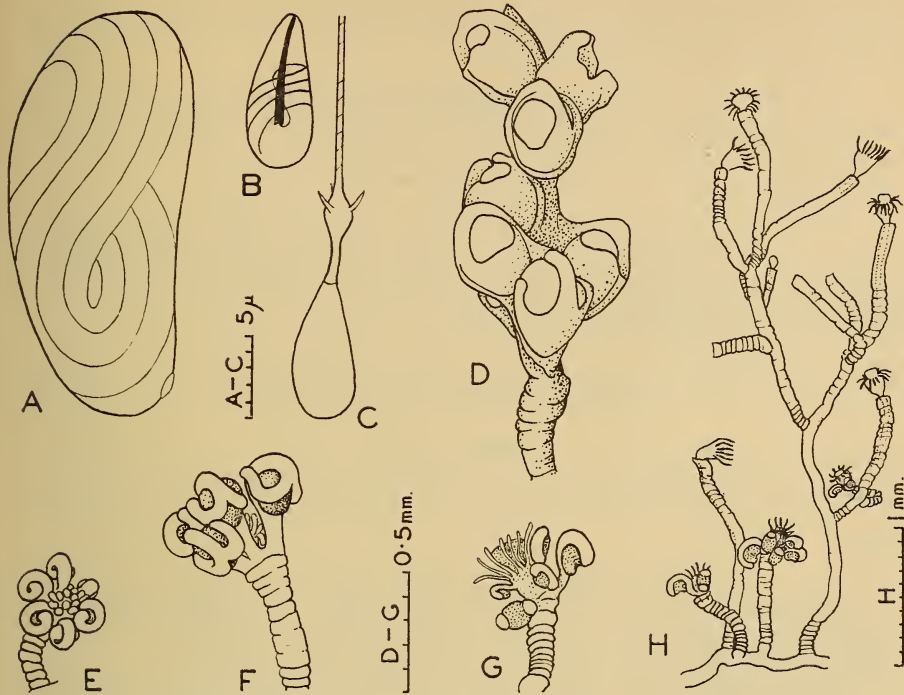


FIG. 1. *Eudendrium carneum* Clarke (A-F), and *Eudendrium parvum* Warren (G-H)

A, a large isorhiza. B and C, undischarged and discharged capsules of heterotrichous, microbasic euryteles. D, old female gonophores showing the basket-shaped capsules surrounding the embryos. E and F, earlier stages in the development of female gonophores showing the bifurcating spadices and the tentacles of the blastostyle. G, a female blastostyle with young gonophores.

H, part of colony with female blastostyles.

Male gonophores borne in an umbel-shaped whorl on a blastostyle devoid of tentacles; 3-4 chambered.

Gonophores observed in January, April and July.

Nematocysts of 2 kinds:

- (i) Large isorhizas, probably atrichous. Capsule pear-shaped, slightly curved, with operculum off-centre, measuring $24 \times 11 \mu$. Tube in many coils, forming figures of 8 in the longitudinal axis. Only undischarged capsules observed. Scattered irregularly on hydranth body and manubrium, but most abundant in the 'nettle-ring'.
- (ii) Small, heterotrichous, microbasic euryteles, similar to those of *E. vaginatum* (see Weill 1934). Capsule pear-shaped, narrowing at summit, measuring $9 \times 4 \mu$. Butt about two-thirds length of capsule, bearing 3 large spines on the swollen distal end. Terminal tube bearing spiral ridges, coiled obliquely in undischarged capsule. Present abundantly on tips of tentacles, and also scattered irregularly in the 'nettle-ring'.

Remarks. This material agrees in all its essential features, and particularly in the nature of the female gonophores, with *E. carneum*, though the nematocysts of the latter have not been described.

It is also very similar to *E. racemosum* (Cavolini), another species with a bifurcating spadix, but differs from it in the absence of cnidophores, in the basket-shaped capsule of the female gonophore, and in the nature of the nematocysts.

E. carneum is known from the east and west coasts of North America, from Brazil, and from St. Helena. It is a new record for South Africa, and has possibly been introduced on the hulls of ships, for it has been found only in Durban Bay and Morrumbene Estuary.

Eudendrium ?parvum Warren 1908

Fig. 1, G-H

Eudendrium parvum Warren 1908, p. 272, fig. 1; Pl. 45, figs. 1-4.

Records. IN 49E.

Description. Colonies growing on weed and reaching a maximum height of 0.5 cm. Stem unbranched or branching irregularly, annulated at base, on the origin of the branches, and at other irregular intervals.

Female blastostyles present, borne on annulated pedicels arising from stem or direct from hydrorhiza. Blastostyle well formed, with manubrium and about 15 tentacles, bearing the gonophores in a verticil below the tentacles. Spadix of gonophore unbranched, arching round egg in form of question-mark, later shed, leaving the developing embryo enclosed in a very thin perisarcial capsule.

No large nematocysts present. Small ones (probably heteronemes) measuring $5.5 \times 2\mu$ present on tentacles and body.

Measurements (mm.)

Hydrorhiza, diameter	.	.	.	0.09-0.13
Stem, diameter	.	.	.	0.09-0.12

Remarks. Vannucci 1954 has included *E. parvum* in the synonymy of *E. capillare* Alder, but I feel that this is a dangerous assumption at the present state of our knowledge. Warren states that his species differs from *E. capillare* in 'the three-chambered condition of the male gonophore, the absence of a well-defined terminal tubercle to the gonophore, and the extension of the perisarc over the base of the polyp'. Vervoort 1946 (p. 146) also states that *E. capillare* has no nettle-ring or annular groove round the base of the hydranth, the latter being present in *E. parvum*.

The present material cannot be determined with certainty in the absence of male gonophores. Warren has not described the female. The general appearance of the colony is very similar to Warren's material, but the hydranths are too badly preserved to determine the details of structure.

Several other small *Eudendrium* colonies are present in the collections from this coast, but in the total absence of gonophores identification has not been attempted.

Family **Hydractiniidae**

Hydractinia diogenes n. sp.

Fig. 2

Holotype. MOR 51H. (S.A.M. registered number H123).

Description. Colonies covering 5 gastropod shells occupied by hermits (*Diogenes costatus*). Hydrorhiza a network of perisarcal tubes, covered by a layer of free coenosarc, but clearly visible through it in the thinner regions. Spines smooth, hollow and horn-coloured, of medium length, reaching a maximum height of 0.6 mm.

Gastrozooids reaching a height of about 2 mm. (preserved), with a long hypostome capable of great distension, and 11–26 tentacles. No spiral zooids or tentacular filaments observed.

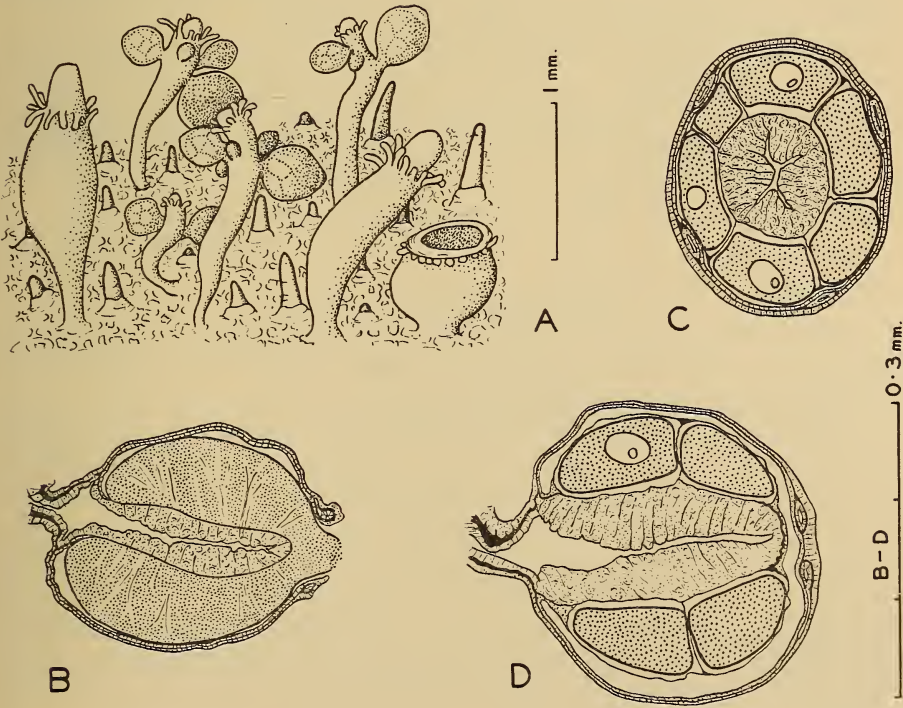


FIG. 2. *Hydractinia diogenes* n. sp.

A, portion of female colony with gastrozooids and gonozooids, drawn from preserved material. B, l.s. mature male gonophore showing circular canal. C, t.s. female gonophore showing radial canals. D, l.s. female gonophore showing circular canal.

Gonozooids variable in size, but generally smaller than the gastrozooids, with 7–15 tentacles. The gonozooids are particularly abundant and well developed around the openings and siphons of the host shells, and may completely fill the latter. In this region they are quite as long as the gastrozooids, but have slender columns and never achieve the same robustness. Some have a well-developed crown of tentacles, but in others, probably due to reproductive exhaustion, the tentacles are reduced to mere stumps.

Gonozooid bearing a circle of up to 6 shortly stalked gonophores near distal end of column. Male and female on different colonies, but colonies of opposite sex may occupy the same shell. Gonophores in the form of fixed sporosacs which have no free-living life (several partly empty ones observed still attached), more or less spherical or with diameter slightly exceeding height when fully mature, with no vestige of marginal tentacles. Spadix well developed, with its internal cavity fairly spacious in the proximal third, but reduced to a crevice in the distal region. Pedicel 0.02–0.07 mm. in length.

Male gonophore swollen with sexual products, which may protrude through the distal aperture together with the end of the spadix, reaching a maximum depth of 0.45 mm. and a maximum diameter of 0.46 mm. Circular canal present around aperture, radial canals not visible.

Female gonophore containing 5–13 large eggs generally in 1 or 2 tiers around a central spadix, reaching a maximum depth of 0.39 mm. and a maximum diameter of 0.43 mm. Radial canals and circular canal present. Though difficult to see in whole specimens the canals are easily visible in empty gonophores and in sections.

Nematocysts of 2 types:

- (i) Desmonemes, $5.0 \times 3.5 \mu$.
- (ii) Microbasic euryteles, $9.0 \times 4.0 \mu$.

Remarks. Only three species of *Hydractinia* with smooth spines are known from the southern hemisphere, namely *H. parvispina* Hartlaub 1905, *H. subinermis* Jäderholm 1923, and *H. altispina* Millard 1955.

H. diogenes is closely related to *H. parvispina*, but since Hartlaub states quite definitely that there are no radial canals in the female gonophores of the latter, the two cannot be synonymous. Attempts were made to obtain material of *H. parvispina*, but unfortunately Hartlaub's type material (deposited in the Hamburg museum) was destroyed during the war. The species was subsequently reported by Jäderholm 1905 from the Antarctic, and prepared sections of this material were loaned to the author by the Naturhistoriske Riksmuseet, Stockholm. The gonophores present were all male and immature, and no further information could be obtained therefrom. No radial canals could be found.

H. subinermis likewise has no radial canals in the gonophores, and further the gonozooids are atrophied with only 2–4 tentacles, and the spines are very short (0.16–0.19 mm.).

H. altispina is clearly distinct from *H. diogenes*, and the differences between the two are summarized in the following table.

	<i>H. diogenes</i>	<i>H. altispina</i>
Colony growing:	On gastropod shells occupied by hermits.	On occupied shells of <i>Thais squamosa</i> .
Perisarcal reticulation of hydrorhiza:	Clearly visible through coenosarc.	Not visible.
Spines:	Of medium length reaching 0.6 mm.	Long, reaching 1.0 mm.
Gastrozooids, number of tentacles:	Up to 26.	Up to 12.
Gonozooids:	Not particularly reduced, with up to 15 tentacles.	Much smaller than gastrozooids, with only 3-5 tentacles.
Male gonophores with:	Spermatogenic cells not divided into groups and no radial canals visible.	Spermatogenic cells divided into 4 groups and radial canals clearly visible.
Female gonophores with:	Large eggs, up to 13 in number.	Small eggs, up to 32 in number.

Sterile colonies are very similar to those of *Podocoryne carnea*, but have somewhat longer spines.

Hydractinia kaffraria Millard 1955

Hydractinia kaffraria Millard 1955, p. 217, fig. 2.

Records. DBN 47M, 94G, 112E (reported by Millard 1955, and by Day and Morgans 1956).

Podocoryne nassa n. sp.

Fig. 3

Holotype. IN 112. (S.A.M. registered number H122).

Description. Colony epizootic on the shell of the gastropod *Nassa* (*Nassarius*) *fenestrata*. Hydrorhiza for the most part reticular, following the depressions of the host-shell and covered with a thin layer of perisarc; but in the denser areas closely packed stolons may be cemented together. No spines, spiral zooids or tentacular filaments.

Hydranths columnar, but narrowed at base, reaching a height of 1.4 mm. (preserved), with a conical hypostome and 8-16 tentacles. A very thin exten-

sion of perisarc sometimes present over the base. Young hydranths have a single verticil of about 8 tentacles, older ones have a second verticil of smaller tentacles developing slightly proximal to the first and alternating with them.

Gonophores arising separately from the hydrorhiza on slender pedicels, developing into free medusae.

The young gonophore is pear-shaped, flattened at the summit and narrowing towards the base where it merges gradually into the pedicel which is only about 0.02 mm. in diameter. The whole structure is completely enveloped

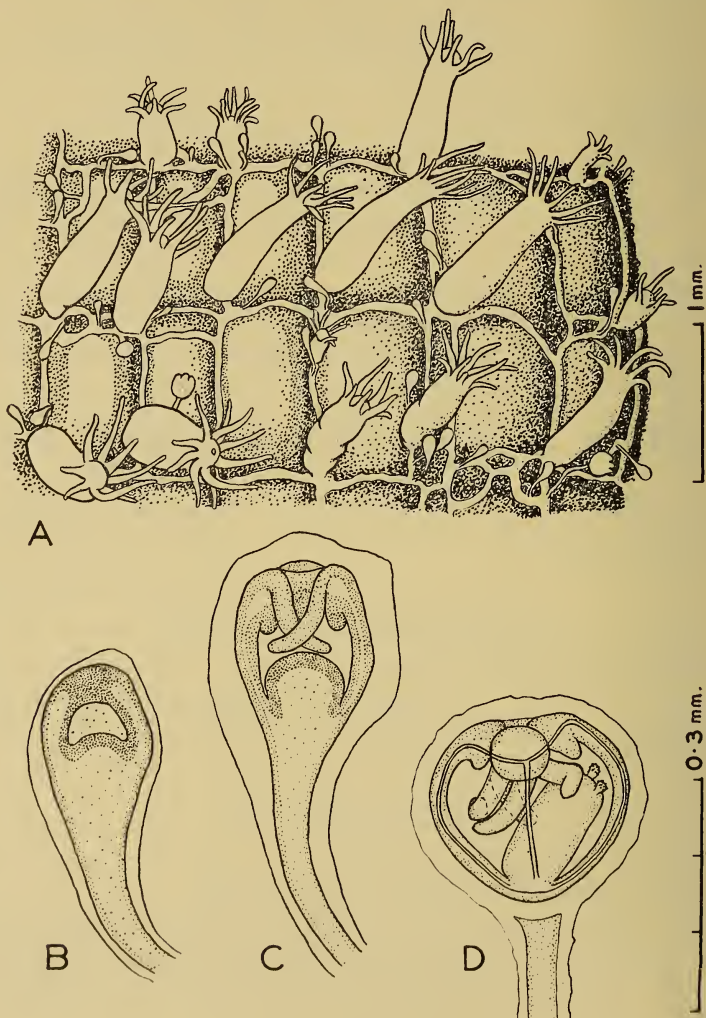


FIG. 3. *Podocoryne nassa* n. sp.

A, portion of colony on snail-shell, drawn from preserved material.
B-D, stages in the development of the medusa.

in a membranous extension of the perisarc. The older gonophore is more rounded and distinctly demarcated from the pedicel. The oldest gonophores present are in the form of young medusae with the diameter approximately equal to the height (about 0.25 mm.), and with the tentacles still coiled up in the umbrella cavity. They have become detached from the pedicel but are still enclosed in a perisarcular membrane.

Medusa with 4 radial canals and a circular, 4 marginal tentacles, a large hypostome not quite reaching the margin of the bell and bearing 4 oral tentacles armed with terminal clusters of nematocysts.

Nematocysts of 2 kinds:

- (i) Undetermined heteronemes, $8.0 \times 3.0 \mu$.
- (ii) ?Desmonemes, $6.5 \times 3.5 \mu$.

Remarks. This is the only species of *Podocoryne* known to the author without spines and with gonophores arising separately from the hydrorhiza.

Family **Pandeidae**

Hydrichthys boycei Warren 1916

Hydrichthys boycei Warren 1916, pp. 172-187, fig. 12; Pl. 17-20.

Records. NA 218.

Description. Several small colonies parasitic on *Chaetodon lunula*. Structure exactly as described by Warren. Medusa buds present in various stages of development.

Family **Bougainvilliidae**

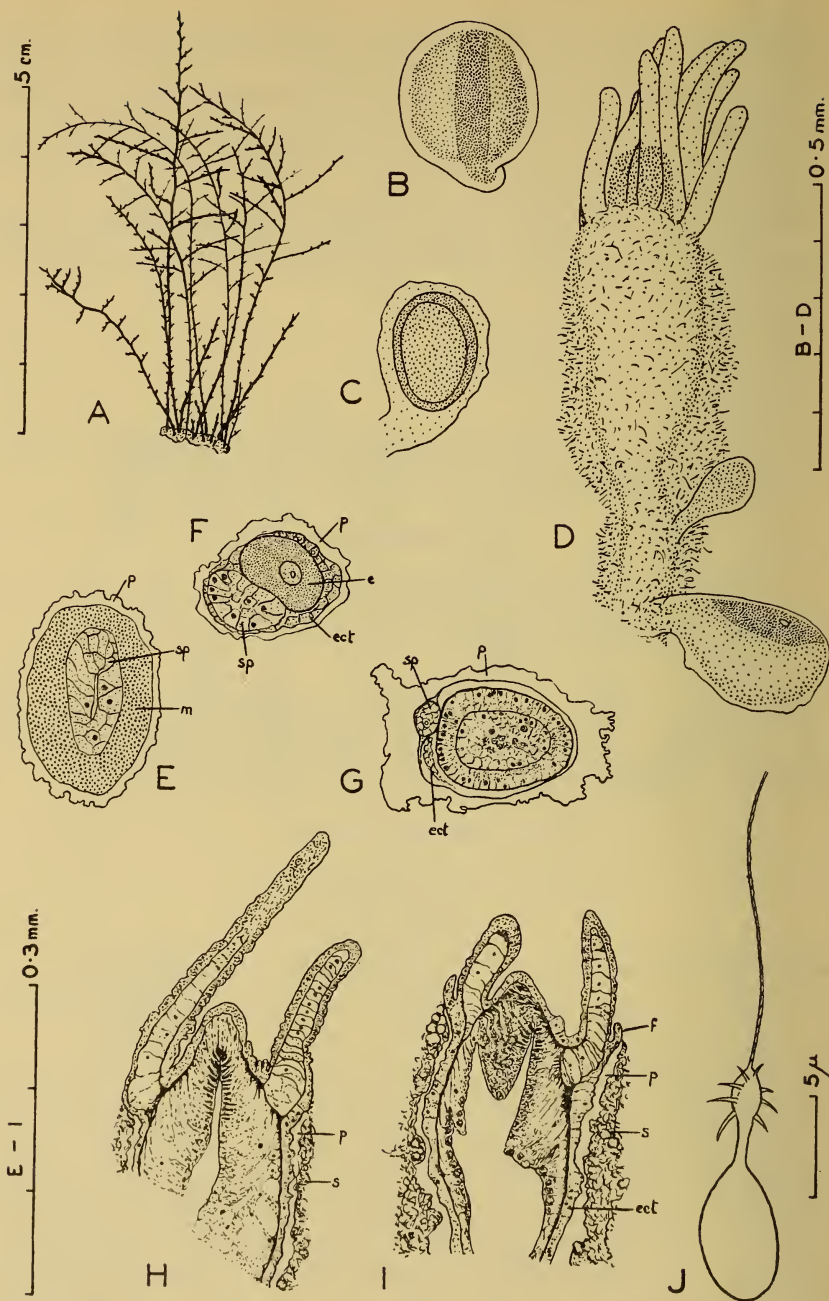
Bimeria fluminalis Annandale 1915

Fig. 4

Bimeria fluminalis Annandale 1915, p. 111, fig. 10; Pl. 9, figs. 3, 3a. 1917, p. 111, fig. 1.

Record. STL 174 (reported by Day, Millard and Broekhuysen 1954 as *Bimeria* sp.).

Description. Rich colonies growing on the aerial roots of mangroves and for the most part thickly covered with diatoms and other epibiotic forms. Hydrorhiza forming a matted feltwork. Stem reaching a maximum height of 6.3 cm., unfascicled, often slightly geniculate in the distal regions, giving rise to alternate branches or hydranth pedicels. Occasionally two hydranth pedicels arise from the same level, either opposite one another or from the same side. Perisarc on stem and branches fairly thick, with adhering silt and diatoms, annulated at base of stem, on origin of branches and on part or all of hydranth pedicels; continued over the base of the hydranth to form a thick 'pseudohydrotheca'. Sections show that the pseudohydrotheca terminates abruptly on the base of the tentacles (fig. 4, H, I), and that the hydranth can be partially retracted into

FIG. 4. *Bimeria fluminalis* Annandale.

A, portion of colony. B, young male gonophore. C, old female gonophore containing planula. D, a single hydranth and two young female gonophores, one with an egg. E, t.s. male gonophore. F, t.s. young female gonophore with egg and spadix. G, t.s. old female gonophore with planula and remains of spadix. H and I, l.s. hydranths, I more contracted than H. J, a heterotrichous microbasic euryte. (e, egg. ect, ectoderm. f, folded ectoderm. m, male generative cells. p, perisarc. s, adhering silt. sp, spadix of gonophore.)

the pseudohydrotheca, but that in the process the ectoderm at the margin is thrown into a distinct fold (*f*). A very thin layer of perisarc appears to continue for a short distance over the tentacles, but it is very difficult to detect and is only visible in isolated regions—there is no definite sheath over the tentacles as in typical members of the genus. Hydranths with 10–12 tentacles.

Gonophores in the form of fixed sporosacs, borne singly or in clusters on the hydranth pedicels, male and female on separate stems. Gonophore completely surrounded by perisarc, with a very short pedicel, and no radial canals or tentacle rudiments.

Male gonophore ovoid or spherical when young, becoming more elongated when mature, bearing a mass of spermagenic material around a central strongly developed, and sometimes curved, spadix.

Female gonophore ovoid, producing a single egg, which is flattened against the spadix, displacing it to one side and causing it to arch over the egg in the manner described by Annandale. After fertilization the egg develops *in situ*. Later the spadix degenerates completely leaving a large oval planula still enclosed in a perisarcal membrane.

Nematocysts of 2 types:

- (i) Desmonemes, $3.5 \times 2.5 \mu$.
- (ii) Heterotrichous microbasic euryteles, reaching a maximum size of $7.0 \times 4.5 \mu$.

<i>Measurements</i> (mm., preserved)	<i>STL 174</i>	<i>Annandale's</i> <i>Type</i> <i>Material</i>
Stem, diameter	0.12–0.32	0.13–0.20
Branch, diameter	0.12–0.20	0.09–0.16
Pseudohydrotheca (mostly contracted):		
length	0.18–0.38	0.13–0.22
diameter	0.21–0.32	0.13–0.29
Gonophores, male: length	0.51	0.52
diameter	0.30	0.23
Gonophores, female: length	0.40	0.30
diameter	0.29	0.24

Remarks. I have seen a sample of Annandale's type material of *B. fluminalis* from Calcutta kindly loaned to me by the Zoological Survey of India, and am satisfied that the South African material belongs to the same species. The general form of the colony is the same, and the nature of the gonophores leaves no room for doubt. Measurements of the type material (a small sample only) are included above.

The nematocysts of the type material are undischarged, but there are two types (heteronemes and desmonemes) whose measurements agree closely with the South African material.

I am somewhat doubtful about the inclusion of this species in the genus *Bimeria*. According to Rees (1938 and personal communication) *Bimeria* and *Garveia* can be distinguished by the presence of tubular sheaths of perisarc over the bases of the tentacles in the former and their absence in the latter. The variable nature of this character in *B. fluminalis* has been remarked on by Annandale, and in the South African material the perisarcular sheath is practically non-existent. Other things being equal it hardly seems a reliable character for generic diagnosis.

B. fluminalis is known only from brackish and temporarily fresh water connected with the Bay of Bengal and Gulf of Siam in specific gravities varying from 1.000 to 1.02575. It is therefore interesting that it should appear in South Africa, also in an estuary. Conditions in St. Lucia estuary are, however, rather different than those described by Annandale, for in times of drought the salinity may rise above that of the sea. The material was found in the 'channel' area just south of the opening of the Mplate River. At the time the salinity in the area was 28‰, but it has been known to rise to 35.7‰, and probably falls very low when the river is in flood. Whether or not the species can survive such drastic changes from year to year is unknown.

SUMMARY

A total of 12 species of gymnoblastic hydroids is recorded. Two of these are new species, namely *Hydractinia diogenes*, and *Podocoryne nassa*, and three are new records for South Africa, namely *Corydendrium parasiticum* (Linn.), *Eudendrium carneum* Clarke, and *Bimeria fluminalis* Annandale.

REFERENCES

- Allman, G. J., 1871-2. A Monograph of the Gymnoblastic or Tubularian Hydroids. London.
- Annandale, N., 1915. Fauna of the Chilka Lake. The Coelenterates of the Lake, with an account of the Actiniaria of brackish water in the Gangetic Delta. *Mem. Indian Mus.*, **5**, 65-114.
- Annandale, N., 1917. Zoological Results of a Tour in the far East. Hydrozoa and Ctenophora. *Mem. Asiatic Soc. Bengal*, **6**, 101-117.
- Clarke, S. F., 1882. New and interesting Hydroids from Chesapeake Bay. *Mem. Boston Soc. Nat. Hist.*, **3**, 135-142.
- Day, J. H., Millard, N. A. H., and Broekhuysen, G. J., 1954. The Ecology of South African Estuaries. Part IV: The St. Lucia System. *Trans. Roy. Soc. S. Afr.*, **34**, 129-156.
- Day, J. H., and Morgans, J. F. C., 1956. The Ecology of South African Estuaries. Part 8: The Biology of Durban Bay. *Ann. Natal Mus.*, **13**, 259-312.
- Ewer, D. W., 1953. On a new Tubularian Hydroid from Natal. *Ann. Natal Mus.*, **12**, 351-357.
- Hartlaub, C., 1905. Die Hydroiden der magalhaensischen Region und chilenischen Küste. *Zool. Jahrb., Suppl. 6 Fauna Chilensis*, **3**, 497-714.
- Jäderholm, E., 1905. Hydroiden aus antarktischen und subantarktischen Meeren. *Wiss. Erg. Schwed. Südpolar-Exped. 1901-1903*, **5**, 1-41.
- Jäderholm, E., 1923. Hydroids from West and South Africa. *Meddel. Göteborgs Mus., Zool.* No. 26, 1-7.
- Kirkpatrick, R., 1910. Description of new species of Hydrozoa and Porifera. Ex Cunningham, J. T.: On the Marine Fishes and Invertebrates of St. Helena. *Proc. Zool. Soc. Lond.*, 1910, 127-130.
- Leloup, E., 1937. Hydropolypes et Schyphopolypes recueillis par C. Dawydoff sur les côtes de l'Indochine Française. *Mém. Mus. Roy. D'Hist. Nat. Belgique*, (2), **12**, 1-73.

- Millard, N. A. H., 1955. New Species of Hydrozoa from South Africa. *Ann. S. Afr. Mus.*, **41**, 215-222.
- Millard, N. A. H., 1958. Hydrozoa from the Coasts of Natal and Portuguese East Africa. Part I. Calyptoblastea. *Ann. S. Afr. Mus.*, **44**, 165-226.
- Rees, W. J., 1938. Observations on British and Norwegian Hydroids and their Medusae. *J. Mar. Biol. Ass. U. K.*, **23**, 1-42.
- Rees, W. J., 1957. Evolutionary Trends in the Classification of Capitata Hydroids and Medusae. *Bull. Brit. Mus. (Nat. Hist.)*, *Zool.*, **4**, 455-534.
- Ritchie, J., 1907. On Collections of the Cape Verde Islands Marine Fauna, made by Cyril Crossland, M.A.(Cantab.), B.Sc.(Lond.), F.Z.S., of St. Andrews University, July to September, 1904. *Proc. Zool. Soc. Lond.*, 1907, 488-514.
- Ritchie, J., 1910a. The Marine Fauna of the Mergui Archipelago, Lower Burma, collected by Jas. J. Simpson, M.A., B.Sc., and R. N. Rudmose-Brown, D.Sc., University of Aberdeen, February to May 1907.—The Hydroids. *Proc. Zool. Soc. Lond.*, 1910, 799-825.
- Ritchie, J., 1910b. Hydroids from Christmas Island, Indian Ocean, collected by C. W. Andrews, D.Sc., F.R.S., F.Z.S., in 1908. *Proc. Zool. Soc. Lond.*, 1910, 826-836.
- Vannucci, M., 1954. Hidrozoa e Scyphozoa existentes no Instituto Oceanográfico. II. *Bol. Inst. Oceanogr.*, **5**, 95-138.
- Vervoort, W., 1941. Biological Results of the Snellius Expedition. XI. The Hydroida of the Snellius Expedition (Milleporidae and Stylasteridae excluded). *Temminckia*, **6**, 186-240.
- Vervoort, W., 1946. Fauna van Nederland. Afl. 14. Hydrozoa (C 1). Leiden.
- Vervoort, W., 1946a. Exotic Hydroids in the Collections of the Rijksmuseum van Natuurlijke Historie and the Zoological Museum at Amsterdam. *Zool. Meded.*, **26**, 287-351.
- Warren, E., 1906. On *Halocordyle cooperi*, sp. n.; a Hydroid from the Natal Coast. *Ann. Natal Mus.*, **1**, 73-81.
- Warren, E., 1907a. Note on the Variation in the arrangement of the Capitata Tentacles in the Hydroid, *Halocordyle cooperi* Warren. *Ann. Natal Mus.*, **1**, 209-213.
- Warren, E., 1908. On a Collection of Hydroids, mostly from the Natal Coast. *Ann. Natal Mus.*, **1**, 269-355.
- Warren, E., 1916. On *Hydrichthys boycei*, a Hydroid parasitic on Fishes. *Ann. Durban Mus.*, **1**, 172-187.
- Weill, R., 1934. Contribution à l'étude des Cnidaire et de leurs Nématocystes, **1** and **2**. *Trav. Stat. Zool. Wimereux*, **1** and **2**, 1-701.